FAA AVIATION NEWS

JULY 1972

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COVER:
Stalking a STOL. FAA is gathering data on operating standards for tomorrow's commuter. See page 10.

FAA AVIATION NEWS

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Winds Across The Runway

Editor's note: The article "Cross Winds and Gentle Pilots" in the March 1972 issue of FAA AVIATION NEWS generated considerable interest and some confusion among readers, particularly with respect to the opposing forces at work on a ***crosswind takeoff****. The present article is addressed to this subject.*

Everyone who has flown an airplane in this country knows about torque as a tendency to move the nose to the left. But some pilots assume that when you take off with a crosswind from the left, the wind will tend to push the nose to the right, nullifying the torque thrust.

This is not true. Most aircraft on the ground have a tendency to weathervane, to turn their nose *into* the wind, not away from it. Once you are airborne, a left crosswind will tend to drift your airplane to the right of the runway, unless you compensate with a left bank, but the wind's effect on your *heading* will push the nose to the left.

It is important to remember that the forces at work on takeoff, such as torque and weathervaning, vary in accordance with the aircraft and the wind conditions, so that one must be cautious about generalizations. However, it is clear that torque is always related to power, and that tailwheel aircraft are more vulnerable to both torque and weathervaning than aircraft with steerable nosewheels. It may be helpful to analyze a left crosswind takeoff in a light general aviation aircraft, step by step:

1. **Start of takeoff.** This is the stage where the aircraft's surface controls are least effective. Or, to put it another way, this is when the aircraft is most responsive to torque, weathervaning and pressure under the upwind wing. With a strong crosswind, many pilots will use full upwind aileron and heavy right rudder pedal before opening the throttle. Depressing the right pedal at the start is especially important with a taildragger, because unless you counter the left-turning forces created by torque and weathervaning at the earliest possible moment, you may not have enough rudder control to prevent the aircraft from running off the runway pavement to the left. (With a right crosswind, on the ground the directional influences of torque and weathervaning oppose each other.)

2. **Rolling down the runway.** As you gather speed and the aircraft becomes more responsive to controls, you adjust them accordingly. You keep enough upwind aileron to equalize pressure on the main gear, and enough right rudder pedal to steer the aircraft directly ahead. With a steerable nosewheel, of course, you need less pedal.

3. **Liftoff.** As you break ground, if you have a steerable nosewheel you will become aware of much stronger torque effect, and you will have to apply more right rudder to prevent the aircraft from turning to the left. You use enough upwind aileron to keep the upwind (left) wing slightly lowered. The lowered wing will create a tendency for the nose to swing to the left, so that at this point you have three left-turning forces at work (torque, weathervaning, and bank effect) that must be countered by rudder pressure. (*With a right crosswind, torque would oppose weathervaning and bank effect, requiring much less rudder.*)

Some pilots, incidentally, have the impression that when you bank against the wind, *induced drag* on the higher wing will cause the aircraft nose to turn downwind. The fact is that most contemporary aircraft have a differential aileron movement—the *up* aileron travels farther than the *down* aileron. Therefore, in a shallow bank, *induced drag* would be about neutral.

The crosswind angle may be minimized, where a wide runway is used, by starting the takeoff roll near the downwind edge of the pavement. However, if the crosswind component is strong enough to warrant such a maneuver, you might want to think twice about flying on this particular day. Winds often worsen as the day goes on. It is much easier to cancel a takeoff than a landing.

Readers who found the crosswind/headwind component chart in the March issue less than convenient might be interested in the simplified formulas supplied by the Nebraska Department of Aeronautics publication, *Pireps*.

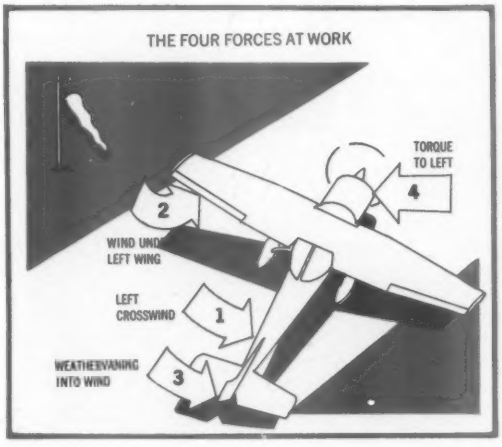
	Wind angle	Sine	Cosine
	30°	.5	.9
Data:	45°	.7	.7
	60°	.9	.5

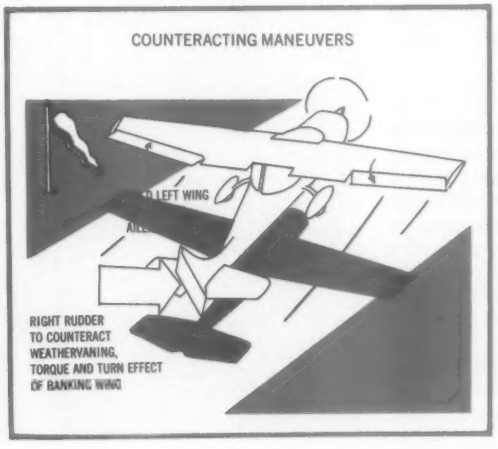
Formula: Wing angle sine × wind velocity = crosswind.

Wind angle cosine × wind velocity = headwind (tailwind).

Example: You wish to take off on runway 28 with a 35 K wind blowing from 305. The actual wind angle is 25°, so you select the sine for 30°. (.5 × 35 = 17.5) Your crosswind component is 17.5.

Similarly, if you were seeking the headwind component, you would have multiplied the cosine (.9) of the wind angle by 35 K. Note that the sine and cosine are the same for the 45° angle, and that they are the reverse for 30° and 60°. Maximum safe headwinds for takeoff are seldom given in owner's manuals—60 percent of stall speed is a good rule of thumb.





Left—diagram shows the four forces applied to an aircraft during a takeoff with a left crosswind. The airplane (once airborne) will be in a body of air moving to the right (1). There will be up pressure under the left wing (2). Weathervaning (3) and torque (4) will swing the nose into the wind. Right—at liftoff these forces are counteracted by left aileron to keep the aircraft over the runway and the left wing down; and right rudder to keep the nose headed in the direction of flight. ■

STRANGE MUSIC

Odd Sounds Issuing From Your Radio May Be Your Airplane Trying To Tell You Something

Probing for the hurt. A good deal of Linberg's time goes to checking, installing and servicing radios, microphones and transponders, and explaining their use to pilots.

Charles C. Linberg, general manager and proprietor of a St. Louis avionics repair shop, is this year's winner in the general aviation category of the FAA's 10th annual Aviation Mechanic Safety Awards. He and his family were flown to Washington where he received his award from FAA Administrator John H. Shaffer in a special ceremony on June 27. He was given an inscribed medallion from the FAA, as well as money and gifts donated by aviation companies and organizations.

The Flight Safety Foundation selected Linberg from among hundreds of mechanic nominees from all sections of the country.

Linberg has been working on aircraft radios for almost 20 years, and he has become an expert on peculiar sounds in a radio that may be used to diagnose other—and perhaps more serious—problems with the airplane, particularly in the electrical system. This diagnostic technique is similar to the one now being practiced in some quarters of medicine when physicians study conditions in the human eye to seek clues to other bodily illnesses.

An educated ear can save an aircraft owner hundreds of dollars, according to Linberg. "All too often a pilot comes in here and says he wants me to fix his radio because it has some strange sounds in it. I go out to his plane and turn on the radio, and there are some funny sounds coming out of it, all right. But when I make a quick examination of the radio, I can't see anything wrong with it. In the old days, I would yank the radio out of the plane and get it up on the bench to tinker around with it. But I've learned to know what some of these static noises mean now, and so I turn up the volume and listen carefully to the sounds coming out of the radio. Just the other day I spotted a set of bad magnetos this way.

Blessing in Disguise

"When we looked at the magnetos we found they were really in bad shape: the coils in both magnetos were cracked, and they had to be replaced. The pilot had no previous indication of magneto trouble; he was able to get a spark, and there had been no loss in rpm's. The fact that we picked up the problem through radio sounds averted what could have been a serious incident, maybe an inflight engine failure."

A doctor who flew a Cessna 206 experienced "radio trouble" in his ADF for two solid years. He complained it had NEVER worked in all the time he had it, and he tried one radio mechanic after another with no good results. (Each took it out, bench-tested it, found nothing wrong. Occasionally one would replace a wire or connection, but nothing worked.)

Finally, in disgust, he decided to trade it in on a new one, and brought the radio in to Linberg, who felt it was something of a challenge. It did not take long for him to suspect the alternator, and he turned the case over to a mechanic who found that the alternator needed an $11 filter.

Linberg says that, although he lost the radio sale that time, he's pretty sure that he will sell the doctor the NEXT radio he buys. "And," adds Linberg, "in the cases where we don't make any money, we sure build up a heck of a lot of good will, and eventually it all comes home to roost."

Linberg has known about this theory of radio sounds indicating other aircraft problems for a long time, but his decision to develop a systematic approach to it was caused by the frustration he was experiencing in pulling a radio out of a plane, working long

One reason Linberg was named general aviation mechanic of the year is that he is always willing to share his knowledge with pilots, other mechanics and with FAA. Here he compares notes on a radio problem with Rex Hall, avionics inspector for the St. Louis FAA District Office.

hours on it, and finally discovering that nothing was wrong with it. He spent two years researching his own system, listening to strange sounds emanating from aircraft radios and then relating them to different parts of the plane. He theorized that these sounds reach the radio in either of two ways: they are radiated in free air and then picked up by the antenna; or they are transmitted through the power line. When these problem sounds are strong and insistent, they overcome the noise dampers in the radio equipment.

Linberg finally became so proficient in identifying the sounds that he was able to pinpoint the precise problems in the various systems from the peculiar sounds in the radio. These sounds enabled him to positively distinguish between malfunctioning in the magneto system, the alternator system, the

It seems fitting for a radio mechanic named Charlie Linberg to be located at Spirit of St. Louis Airport. Keeping the equipment operating in the privately operated control tower on the field is all in a day's work for Linberg's Ozark Aircraft Radio Company.

generator system, the ignition, rotating beacon interference in ADF's and various engine problems. He then made tape recordings of the specific sounds characteristic of these problems, and he uses the tapes for the benefit of the mechanics he trains in his own shop.

Linberg feels that his system can be of critical help in avoiding aircraft tragedies. The cracked magneto coils are a not uncommon occurrence, for example, as are problems in the alternator system. Not long ago, a pilot approached Linberg about a radio difficulty, which was quickly traced to the alternator. "When we looked under the cowling, I found that the alternator had physically broken loose from its mounting, and was about to drop off. You should have seen the color of *that* pilot's face. *Radio* trouble!"

The Linberg system of radio analysis not only has prevented accidents, but also saves the private pilot a considerable amount of time and money. One pilot came to him not long ago after the pilot had spent hundreds of dollars in other shops on radio repairs and still could not get his radio to function clearly. The problem sound was traced to the turn and bank indicator. "There's a small DC motor in the turn and bank indicator, and the radio was picking up sound from it. An $11 part for the turn and bank solved the problem immediately." The DC motor to the turn and bank indicator was easily isolated because it is the only motor in most airplanes that comes on when the master switch is turned on. The others have off-on switches.

Not all radio noises that are outside-induced are bad—sometimes they are reassuring to pilots. A good example is the little clicking noise sometimes picked up from the fuel pump (if there is one) at low rpm's. Some pilots rely on it to tell them that the fuel pump is doing its job.

How many strange radio sounds indicate problems in other parts of the aircraft?

"At least 25 percent of them", he believes.

Linberg claims no credit for inventing the diagnostic technique. "The older mechanics are aware of it, but many of the younger ones aren't. We're trying to teach them about it."

Is there anything descriptive about these sounds so that a pilot could determine if he's having aircraft problems but has no access to tapes?

"Unfortunately, no. A pilot would have to listen to the tapes before making a decision like that. It requires a trained ear. And I would never try to *tell* anybody what a noise sounds like; I'd want him to hear the noise for himself. But I would say this—if a pilot is hearing strange noises in his radio, he should take his plane to a good radio man immediately and let him determine what the problem is. If he just assumes the problem is in the radio and won't bother his flying locally, he might be making a tragic mistake."

Linberg is trying to disseminate his tapes as widely as possible. He takes them to meetings of pilot and mechanic groups in the Greater St. Louis area, and last year he was invited by the local FAA office to speak at the annual aircraft inspectors meeting. There he played the tapes of radio noises which indicate generator and alternator problems.

He also lends these tapes to groups in other parts of the country and FAA accident prevention specialists are currently evaluating them for possible use in safety seminars.

Charles Linberg got his start in aviation when he joined the Navy after graduating from high school in 1951. He had always been interested in airplanes, and he became a radio operator in order to fly on DC-8's and B-17's. It was a new Navy regulation that got him into the mechanical part of aviation: a directive that required radio operators to also be radio *technicians*.

"It was one of the best things that ever happened to me," he feels, "because I wanted to keep my radio flying job and so I went to technicians school." He ultimately spent six years in the Navy, and he cannot speak highly enough of the training he received. "It's the best kind of technical education you can get, and you couldn't duplicate it outside the service for any price."

Along the way Linberg also obtained a pilot's license, and when he left the service in 1957 he decided to make aviation his continuing career. He was unable to obtain a piloting job with the airlines, and so he went to work in the radio shop of a small aircraft service company at Lambert Field, St. Louis. He later moved over to Motorola Aviation Electronics as field service engineer for the Midwest region, and then to Malcom Jacobs Aviation Company. Finally, in 1967 he founded his own firm, Ozark Aircraft Radio Company, which is now based at Spirit of St. Louis Airport.

Good Neighbor Charlie

His firm, which specializes in general aviation avionics installation and repair, has been quite successful, not only because of Linberg's remarkable skills in avionics but also because of his genuine friendliness and unfailing kindness. He spends hours on the phone each day answering questions from both beginners and experienced pilots, and he will work far into the night if necessary to get a customer's plane ready for a trip the next morning.

Linberg believes the FAA regulations which apply to his work are sensible safety precautions and he adheres closely to them. He does his book work meticulously, figuring weights and balances carefully and making sure of proper log book entries. If he finds any sloppy work done by some previous mechanic he refuses to let it pass but redoes it in the correct and approved way.

"When we opened our shop in 1967, we made a commitment to the pilots around here that we would keep their avionics in excellent shape, and we intend to fulfill that commitment." As a result, he now has three full-time mechanics in his shop, and last year he did about $100,000 of sales, working mostly on single-engine and on light and medium twin engine aircraft.

Incidentally, businessman Linberg is still an accomplished flyer, and in 1960 he was the winner of the St. Louis Aero Club race, a 300-mile round robin. However, his growing firm keeps him so busy these days that he has little time for pleasure flying, except for aerial jaunts to nearby airports to pick up supplies and parts.

He and his wife, Lee, have three children, the eldest of whom is 16. As yet none of them has shown any interest in aviation as a career. "Like most kids today, they only regard it as a fast mode of transportation."

As the years go by they are likely to realize that because of people like Charlie Linberg, aviation is not only becoming faster but also safer. ■

Programmed for Destruction

Psychological postmortems reveal how the wrong mental attitude can override all mechanical safeguards

When a respectable middle-aged businessman, an industrious pillar of his community and an experienced, skillful pilot, takes off in his own airplane on a fine summer day—and is found in the charred wreckage an hour later, the victim of a fatal crash for which there is no apparent cause, mechanical or otherwise, you have to search for hidden factors.

For pilots in this age bracket, sudden incapacitation due to heart failure is often suspected. But often a post-mortem examination will reveal no sign whatsoever of heart disease. However, a psychological post-mortem may bring to light an overwhelming combination of emotional pressures that could justify ascribing the probable cause of the "accident" to an unconscious or *subintentional* suicide impulse.

The psychological post-mortem is being developed as a technique in accident investigation by Dr. Robert E. Yanowitch, a consultant in psychiatry to FAA's Office of Aviation Medicine. An instrument-rated, multi-engine pilot himself, Dr. Yanowitch has specialized in suicide prevention work. He has modeled his technique on the program evolved by the Los Angeles Suicide Prevention Center.

The Federal Air Surgeon refers accident fatalities of undeterminable cause to Dr. Yanowitch, who proceeds to conduct interviews with surviving family members, friends and associates. By patiently putting together fragments of remembered conversations, as well as personal observations, historical and medical data, etc., the psychiatrist is able to bring into view a previously hidden or shadowy picture of the accident victim, revealing in some cases an accumulation of emotional pressures that could no longer be contained.

When, according to Dr. Yanowitch, an individual encounters problems—financial, physical, social—which tend to disfigure his self-image, his life style may not be flexible enough for him to accept or adapt to the new situation. If he has prided himself on his infallibility, a business reverse or loss of property may seem overwhelming. If his sense of masculinity has been a strong prop to his ego, he may find it impossible to accept a crippling or limiting illness, or the loss of his wife's affection.

Under such circumstances the harassed individual may embark on a course of action which will relieve the pressures by bringing an end to his life. The airplane is a useful weapon for suicide, inasmuch as the victim of an air crash is usually considered with sympathy and perhaps even admiration—in contrast to the man who jumps off a building, and is viewed as merely psychotic or cowardly.

The suicidal impulse may be consciously known, and even announced, but more often it is subintentional. The pilot may engage in aerial maneuvers that are clearly beyond his capacity or that of the airplane. There is reason to believe that subintentional suicide impulses may be associated with certain cases of heart failure in flight.

A recent typical case researched by Dr. Yanowitch involved a 52-year-old self-made business man, owner of his own firm, married to the same wife for over 30 years, the parent of a bright college student. He was highly regarded in his community and belonged to several civic associations. He owned and flew a well-equipped twin and drove a Cadillac.

On the day of his last flight, the line crew noticed that he was not his usual cheery self, but short-tempered and brusk, the first time they had ever seen him in that mood. Immediately before the flight he made a telephone call from the hangar, asked a question angrily to whomever he was talking with, and then slammed down the phone in disgust. He took off solo in the bright afternoon sunshine and made a normal departure. Four minutes later the plane was seen to suddenly nosedive toward the ground. It struck the earth at a 45° angle, killing the pilot instantly.

A psychological post-mortem soon disclosed that the deceased pilot's life had reached a point where the facade of beloved husband/business genius/virile athlete could no longer be maintained. He had been unfaithful to his wife, who had a terminal illness; he was unbelievably beset with debts, and under suspicion of arson; and he could no longer maintain his airplane, the super symbol of his masculinity. A last flight offered him a fantasy of escape.

Dr. Yanowitch feels that the unconscious suicidal use of the airplane to relieve individuals from emotional stress may be avoided, in some cases, if pilots are educated to the danger. The psychological post-mortems often uncover a typical abrupt change in the behavior of the incipient victim just before the fatal crash. He may become noticeably depressed, glum, and withdrawn. He may become irrationally angry with mechanics, fellow pilots, air traffic personnel. His flying may become markedly sloppy.

Any pilot who becomes aware that he is behaving irrationally, for whatever reason, should avoid flying. A flight into the blue is not a good means of "cooling off" after a spat with your wife, boss, or tax collector.

Thus far Dr. Yanowitch has completed 16 psychological post-mortem investigations into unexplained fatal crashes. In most cases he feels that the probable cause was a suicidal effort, usually subintentional. With further study and analysis, he believes, a fairly recognizable "emotional profile" of the pilot under dangerous stress may be evolved. Informed pilots may be able to recognize warning signals in time to prevent tragic accidents to themselves and others. Dr. Yanowitch emphasizes the individual responsibility, since he feels that it would be difficult for an untrained person to apply such a profile to a fellow pilot.

Flying is an important part of many persons' lives, but he warns that it should not become a refuge from reality. Indulging in fantasies of aerial omnipotence is like programming the flight computer for destruction. ■

Cleared to Go III

SPECIAL VFR

When you fly VFR below minimums, you are in among the pros.

Third in a series of articles on the various types of air traffic clearances.

Most of the clearances a VFR pilot deals with have to do, naturally, with operations in VFR weather. A notable exception is the Special VFR (SVFR) clearance, specifically designed to permit non-instrument-rated pilots to fly into or out of a controlled airport when less than VFR conditions of 1,000-foot ceiling and three-mile visibility prevail. (A recent rule prohibits the use of SVFR at night unless the pilot is instrument-rated. See page 14.) The SVFR clearance ends at the limit of the airport control zone. Beyond it, you must maintain VFR flight.

The control zone, marked by blue dashes on the sectional chart, usually consists of a circle with a five-mile radius surrounding the airport, plus any extensions necessary to protect the instrument approaches. (If the control zone is marked by little "T's" instead of dashes it means that Special VFR operations are not permitted there.)

"Unknowns" are not permitted in the control zone in IFR conditions. This is one reason why it is necessary for the VFR pilot to obtain a formal *clearance*. With reduced visibility the controller must know the location of all aircraft at all times.

Normally the SVFR arrival or departure clearance instructions are fairly simple, but because the SVFR plane is moving in an environment where aircraft separation is controller-maintained, the pilot must understand and follow the clearance to the letter.

Preparing to depart an airport under Special VFR rules, you request your clearance from clearance delivery or ground control before moving the plane from the ramp. It is not necessary to file a complete flight plan, but you should at least state your intended direction of flight. A typical request might read:

Ground Control, this is Cessna 3720X, on the east ramp with information Golf, requesting special VFR clearance for a flight northwest.

Be ready with paper and pencil to copy the clearance as it is issued:

Cessna 3720X, you are cleared out of the control zone northwest, maintain special VFR conditions at or below 2,000 feet while in the control zone, report leaving the control zone. (Taxi information may be given before or after the clearance.)

The decision to conduct a flight under Special VFR conditions rests entirely with the pilot-in-command as part of his responsibility for a safe flight. *The controller is not authorized to refuse to grant a SVFR clearance because of threatening weather outside the control zone.*

Takeoff clearance will be granted when traffic allows and you depart the control zone as cleared. Unlike an IFR departure, on SVFR you must remain clear of the clouds and have one-mile visibility at all times. If radar service is available vectors may be given; use of radar service is the pilot's option. Remember that while ATC radar can be used for aircraft separation it cannot be used to separate you from IFR conditions; that, as always, is the responsibility of the pilot. If it appears that you cannot comply with both your ATC clearance and the required weather conditions you should advise the controller at once.

Specific altitudes are not given in Special VFR clearances. Instead you will be instructed to remain "at or below" a given altitude. This level will be at least 500 feet below any conflicting IFR traffic, but not below the minimum safe altitude prescribed in the FARs. The actual level selected by the pilot must bear this in mind. A SVFR clearance does not excuse the pilot from maintaining a legal altitude above obstacles, populated areas, etc.

A SVFR clearance to *enter* the control zone should be requested from approach control, tower or FSS well before you reach the control zone boundary. It is a good idea to scan the sectional chart for prominent landmarks such as rivers, railroads, shopping centers and the like that will tell you when you are approaching the control zone boundaries. If you have not received your clearance when you near the zone, hold (circle) outside, and advise approach control of your position and altitude. *Whatever you do, do not enter the control zone without a specific clearance.*

You may have to wait for your clearance until you can be fitted in between other SVFR or IFR approaches. The controller will always try to give you an idea of how long your delay will be and will tell you *why* you are holding. A VFR pilot holding in marginal weather must remain extremely alert. It may help to circle a recognizable landmark, keeping close tracks of your direction, so that you are correctly oriented when you receive your clearance into the control zone and to the airport.

As in departures, you may request—or be offered—radar vectors, but whether on radar or not it is vital that you follow instructions precisely. You tell the tower when you can see the airport, receive your landing clearance, and land as usual.

Most of the problems associated with SVFR occur *outside* of the control zone, and arise from poor judgment regarding weather in the en route phase of flight. Special VFR is designed to help a VFR pilot who conducts a flight in normal VFR conditions but finds weather conditions at his destination airport have deteriorated to less than VFR conditions before he arrives. (If he learns of the terminal weather change while en route, he should not continue.) SVFR is also useful to VFR pilots who operate at airports with local smog or haze. It is not designed to enable a VFR pilot to travel in IFR weather.

The typical accident-in-the-making SVFR request comes from the VFR pilot grounded by bad weather in the course of a cross country flight. He learns that the sun is shining over his destination airport, and he convinces himself that if he can only get airborne he can pick his way VFR between the clouds. In a recent example, a pilot flying from northern Virginia toward Pittsburgh took off SVFR and immediately found himself boxed in between the rising Appalachian Mountains and the clouds while the visibility remained little better than one mile. The controller's comment, "I hated to see him take off," was almost the pilot's epitaph—the aircraft crashed against a mountain, injuring all four occupants.

Special VFR should be used only when sub-VFR conditions clearly do not extend beyond the airport control zone. In view of the scarcity of uncontrolled airspace over much of the country, VFR pilots should assume they will need at least three miles of visibility and a 1,000-foot ceiling to operate legally and safely.

Similarly, the VFR pilot should never set out on a flight toward an airport known or expected to have less than VFR conditions, on the assumption that SVFR will get him down. This kind of flight "planning" is more likely to land you in trouble than at a desired terminal. ■

Up Drafts and

Learning to extract lift ener

One of the advantages of cross country sailplaning is that it teaches you how to deal with the kind of air that power plane pilots normally avoid: turbulent air. All air is in motion, to some extent, but the kind that the sailplaner seeks out is the updraft. It is usually invisible, so he must come to recognize its presence by the prevailing atmospheric and geophysical conditions. His power source is the air itself; he must become adept at finding lift and avoiding sink and this kind of education can be of enormous value to power pilots, whether they fly in flat or mountainous country.

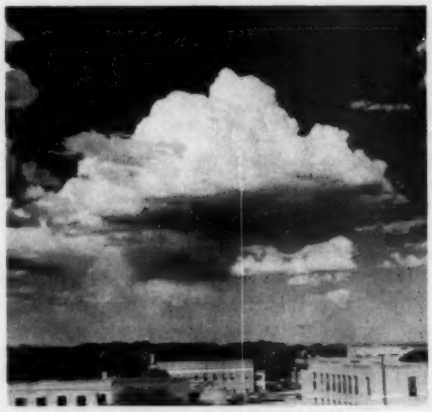
A sailplane off the tow is always descending, in relation to the body of air through which it is flying. Whether the aircraft is rising or falling in relation to the earth depends on its sink rate compared with the direction and speed of the particular body of air involved. High performance sailplanes have a minimum sink rate of less than 2 feet per second; updrafts may easily reach a velocity of 1,000 feet per minute, or about 16½ feet per second. Under these conditions, a sailplane would achieve a climb rate superior to that of many small powered aircraft.

The kind of updrafts used in learning the art of soaring are much less energetic. Early gliding enthusiasts discovered that when air moving across a plain or sea encountered a hill, the air was forced upward. The actual pattern of the **hill lift** with relation to the hillside and top, and the height to which it rose, varied with the velocity of the wind as well as the grade of the hillside. Under some circumstances, there is a "roll" pattern of turbulent air up against the hill. In general, the more abrupt or irregular the hillside, the more unpredictable the local turbulence, and the wider a berth it should be given, in the interest of safety. A gradually rounded hilltop will produce a gradually diminishing windward updraft, whereas a sheer cliff or an irregular promontory may produce freakish wind shifts or drops. The sailplane pilot has his trusty variometer to help him feel the thrust of the wind, but he must also depend on his eyes to judge and anticipate its behavior. He learns how to approach the windward side of the ridge with caution—at an angle that permits a quick, short turn away from the slope, in case the expected lift is not there. Also he learns to use airspeed to traverse quickly through areas of zero or negative lift.

While hill lift is usually fairly local, extended mountain ridges do exist where it is possible to soar for hundreds of miles and return, nonstop, in a sailplane. The world record for out and return distance soaring was set last winter along the Allegheny Mountains, between Pennsylvania and Virginia, by the celebrated "ridge runner," Karl Striedieck. He used hill lift to travel 569.36 miles, from Bald Eagle Ridge, Pa., to Covington, Va., and return.

Incidentally, determining the windward side of a hill, as opposed to the leeward side (inhabited by downdrafts) is not always a simple task. The pilot has to be on the lookout for the posture of trees, the movement of tall grass, clotheslines, flags; the drift of smoke or dust, etc. In a pinch he can judge from his own drift over a fenceline or straight road. Normally he will avoid approaching a hillside unless he has enough altitude to glide from the hill to a safe landing spot.

Thermalling was the second source of lift to be discovered by soaring pilots. Thermals are updrafts caused by heat convection, as a result of the sun warming a given surface more than the surrounding terrain. Thermals only occur in the daytime, of course, and seldom in winter, but they do have the advantage of being found widely across the country, and thus make possible long distance soaring.



Typical flat-bottom cumulus clouds that often signal the presence of thermal action.

Thermal hunters look for surfaces that respond relatively quickly to the sun's rays —dry lake beds, ploughed fields, race tracks, paved and built-up areas, beaches, barren hillsides. The earliest thermals of the day usually occur over slopes that face the east (the angle of the sun is less oblique), and conversely, late-in-the-day thermals are found over westward facing slopes. Vegetation of any kind is likely to invite down drafts rather than updrafts. Swamps and wet areas are to be avoided, since solar heat is used up in evaporating water.

Thermals are strongest, of course, during the early afternoon when heating by the sun's rays is most intense. In its early stages, the thermal may consist of bubbles of hot air rising intermittently. Later, as the heated surface produces a seemingly steady flow of air, the thermal may be experienced as an almost solid column of air.

The thermal has no specific shape, or course, or area; it could be a hundred feet or less in diameter or several hundred feet. Its form and area are determined by the "griddle" below and the movement of wind. Indeed, winds of more than 20 mph tend to break up thermals making the pilot work harder to reap benefits from the lift available.

Can a thermal be seen? The rising air itself is invisible, but it may be carrying dust, smoke or particles of debris. It may also be supporting soaring birds, such as hawks or vultures, or gliders. Some, but not all, thermals are capped by a cumulus cloud in its early formative stages. Typically such clouds have a flat bottom and a smooth rounded top. **Caution:** do not get carried up into them. Cloud soaring is not only illegal in this country but potentially very dangerous. Within the cloud the thermal's energy may be increased many times by the release of heat from condensation of vapor. The rate of climb or descent could

nd Down Drafts

ift energy from the elements.

easily jump to several thousand feet per minute.

Ordinarily the velocity in a clear air thermal ranges from just enough to neutralize sink (about 2½ feet per second) to three or four hundred feet per minute, in altitudes between 500 and 8,000 feet above ground. At the top of the thermal the air has cooled to that of the surrounding air. The cooler air sinks to replace that which was heated and lifted as a thermal. This sink rate is appreciably less than the updraft rate, since the air is dissipated over a wide area; however, the sink rate is fastest nearest the thermal. A low pressure area near the base draws air into the rising column or bubble from all directions. If you could plant windsocks around the perimeter of a thermal base, they would all blow in toward the center.

Thermals usually lean. Although the base remains "attached" to the earth, the thermal bubbles drift, as they rise, with the prevailing wind. The pilot who does not take this movement into consideration may lose his lift long before the updraft subsides.

The thermal hunter often senses an updraft first with the seat of his pants, although, of course, his variometer or climb/descent instrumentation will confirm his impression with scientific accuracy. Beginning sailplane pilots are usually taught to roll into a gentle bank the moment they encounter lift and fly three-quarters of a circle, noting the segment of greatest lift. They circle toward the "core" of the thermal and endeavor to remain within the strongest lift area by flying in a continuous shallow or steep turn, as necessary, until they run out of lift or approach a cloud base overhead.

Thermal flying is excellent training for the kind of engine-out emergency that leaves you in a light, powerless airplane with a long way to go for a landing field. A power plane will not soar like a sailplane, but its descent can be significantly retarded by a pilot who is sensitive to the vertical movement of air over the ground.

Wave soaring depends upon a type of lift which calls for a greater knowledge of meteorology than most pilots, power or soaring, have the opportunity to master. Where the wind blowing *against* a slope will produce an updraft extending perhaps several hundred feet, at most, the movement of the air passing *down the leeward side* of a mountain may culminate in an updraft as high as 50,000 feet or more, which is higher than most lightplane pilots care to go.

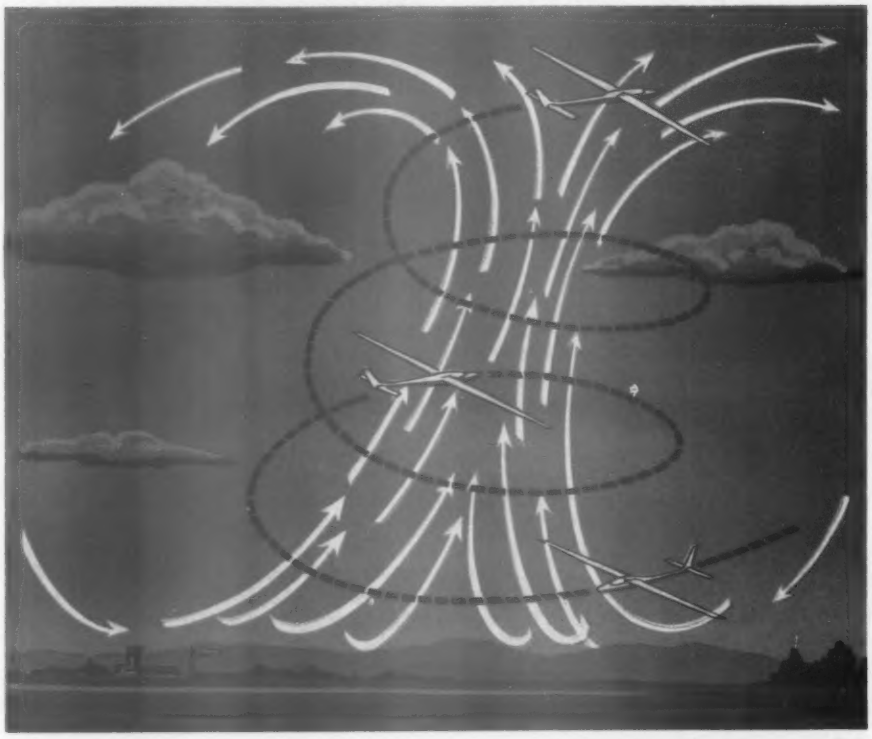
The tremendous energy responsible for this kind of lift is produced, when certain atmospheric conditions exist, as waves forming on the lee side of mountains. These waves, like sound waves, may cancel each other out, or may amplify each other to an unbelievable degree. The available lift depends on such factors as wind velocity and configuration of the mountain. The familiar warning signs of lee waves—lenticular clouds—may or may not be present, depending on the humidity present in the air.

Whenever a pilot flies over a mountain ridge with a tailwind in excess of 25 mph, he can anticipate the possibility of lee waves in his flight path. An area of strong vertical lift may be followed by an area of extreme turbulence where rotor waves whirl the air in all directions. This pattern of lee wave/rotor wave may be repeated several times. Lee waves have been used by expert soarers (oxygen-equipped) to reach altitudes higher than 40,000, but their associated turbulence has also been the cause of numerous accidents.

Mountains are traditionally known as the breeding ground of storms, but the latest exploits of high altitude soaring have given us even greater reason to fly over them with caution and respect, even on cloudless days.

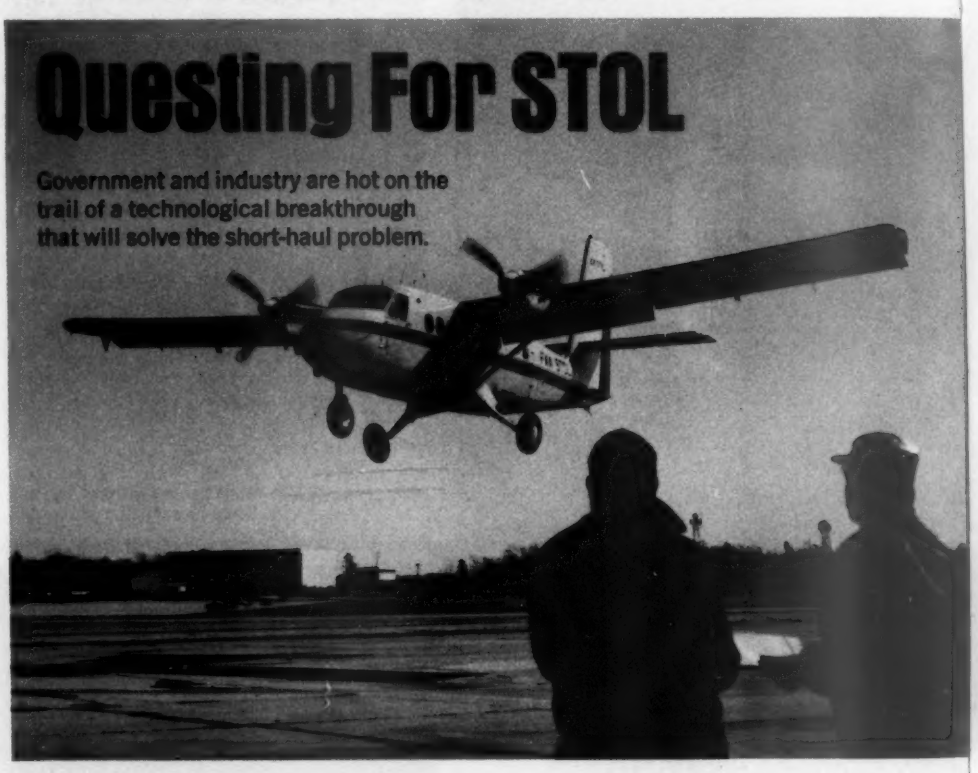
(This is the third and concluding article in a series discussing powerless flight.)

Schematic drawing of a summer thermal. Arrows indicate direction of air movement.



Questing For STOL

Government and industry are hot on the trail of a technological breakthrough that will solve the short-haul problem.



The next generation of aircraft, which may affect the decade of the 70's as remarkably as the jet generation affected the 60's, is of special interest to general aviation, since it will bring transport aircraft to airports of the type normally identified with light planes. Neither the engine nor the airframe is yet in sight, but FAA is stepping up efforts to bring about a successful breakthrough in the design of a quiet short-haul transportation system. Sometimes referred to as V/STOL (Vertical or Short Takeoff and Landing), the concept envisions aircraft that will operate acceptably from runways or platforms extending less than 2,000 feet.

FAA is focusing attention on the need for V/STOL capability because of increasing problems in short-haul service. Today about half of all air travel consists of trips under 500 miles; nevertheless, the typical short-haul passenger spends about two-thirds of his door-to-door travel time just trying to reach the aviation system. Concern for the environment, the advent of large jets, plus the rising cost and increasing scarcity of desirable real estate have pushed the airport ever farther from the centers of population. In some of the densely populated areas of the country passengers are spending as much as three hours in ground travel for every hour in the air. This kind of time expenditure does much to nullify the near-sonic speeds of the jet airplane as the modern form of travel.

The solution to this problem, according to FAA Administrator John H. Shaffer, is to bring aviation closer to where people live and work by means of a short-haul service that is environmentally acceptable, with minimal land use requirements. V/STOL can provide that service with aircraft that will have far steeper arrival and departure paths than conventional aircraft and yet be speedy enough to cut down significantly the overall travel time of the short-haul passenger.

Vertical and short takeoff and landing aircraft have been in existence for many years, of course; some experiments with helicopters pre-date the Wright brothers, who considered the 'copter but dismissed it as impractical. Today there are a number of FAA-certificated STOL general aviation aircraft, such as the Fairchild Hiller *Porter*, the Helio *Stallion*, the Dornier *Skyservant*, the Short *Skyvan*, the Britten *Islander*, and the DeHavilland *Twin Otter*. There are also STOL modification kits that may be applied to other light aircraft, giving them increased lift.

Economic considerations, however, generally rule these aircraft out of the short-haul passenger market. Maintenance costs of helicopters, for example, give them a prohibitively high seat/mile cost. Limited seating capacities on the existing fixed-wing STOL craft (the range is betwen 8 and 20 seats), plus relatively slow airspeeds and other considerations have made these aircraft unattractive to heavily travelled short-haul markets, although some *Otters* are in scheduled service in a few special areas, such as New York and Florida. As corporation, emergency or government vehicles, on the other hand, V/STOL aircraft have been extremely useful.

Perhaps the nearest thing to a transport STOL tested in this country is the McDonnell-Douglas modification of the French-built *Breguet*, originally a military troop transport with a maximum capacity of 67 persons. Both Eastern Airlines and American Airlines have experimented with the *Breguet*, which is capable of taking off and clearing a 50-foot obstacle within 1,600 feet. Cruise speed is about 250 knots. The aircraft is a four-engined turboprop designed with a deflected slipstream design to distribute the propeller blast effectively over the wing. Another feature of the *Breguet* is propeller shaft synchronization: one engine alone is capable of transmitting power to all four shafts.

Experimental efforts to design a transport-size aircraft with true STOL characteristics have been going on for several decades, particularly in the military field. One such approach is the so-called "augmented-lift-wing" concept which, in one way or another, involves increasing the volume of air moving across the top of the wing. In one variation, compressed air is piped out of the compressor section of a turbine engine and expelled through slots in the top of the wing.

Another experimental approach is the so-called "tilt-wing," in which either the wing, the engines or both are rotated upward during the landing or takeoff phase of flight. In still another concept, gigantic fans are used to provide lift for this purpose. In the "fan-in-wing" configuration, the fans operate only during vertical movement, with other engines providing forward propulsion during level flight.

In the "ducted fan" configuration, enormous fans surrounded by aerodynamic ducts first direct their force downward to obtain lift and then slowly rotate to provide horizontal thrust. The ducts around these fans are designed to compensate aerodynamically for the absence of actual wings.

The "jet lift" design uses the exhaust of jet engines which either rotate or are active only during takeoff and landing. Even the venerable autogyro concept, using both a rotating wing and a fixed wing, is being re-examined for V/STOL possibilities.

It is still much too early to determine which of many approaches will produce a successful airplane, but some of the best resources of industry and government are at work on the problem. NASA has recently let a series of contracts for studies and proposals leading to a research vehicle.

Boeing has also announced that, in conjunction with *Aeritalia*, it is planning to design, test and build a commercial jet STOL capable of carrying 100 to 150 passengers. The race for the ideal *quiet* STOL, with 100 plus seating capacity and airspeeds over 400 mph, is wide open.

To stimulate interest and plan for the future inclusion of this coming generation of aircraft into the existing air traffic system, FAA now has a V/STOL Special Projects

Office. FAA planners have identified at least five major regions in the country in which V/STOL would be practical now: the well-known "Northeast Corridor," running from Washington, D.C. to Boston; the state of Florida, which now has little in the way of intra-state air transportation; the Chicago-Detroit-St. Louis area; southern California; and the Portland-Seattle region.

The agency also has an ongoing test program at NAFEC (National Aviation Facilities Experimental Center, in Atlantic City) to established criteria for acceptable STOL arrival and departure flight profiles, and for all-weather STOLport requirements. A relatively inexpensive Instrument Landing System for STOLports is also being evaluated.

How will V/STOL aircraft be employed and integrated into the existing aviation system? Four possible applications hold promise: for short-haul (less than 500 miles) intercity flights, using close-in V/STOL ports so as to reduce the ground travel time to outlying airports; as a transfer vehicle from small close-in STOL ports to a regional hub jetport; from a hub to a small town airport; and even possibly as a commuter vehicle between outlying suburbs and city center (although this, in all likelihood, would be much farther in the future, if it occurs at all).

The first application will probably be on the short-haul intercity flights in high-density corridors. This represents a tremendous commercial market because more than 50 percent of all commercial passengers trips today are under 500 miles. Furthermore, it is on precisely this kind of trip that the time-saving advantage is most neutralized by the problem of getting to and from the airport, an increasingly time-consuming trip that eats up more and more of the time saved in traveling by air.

Hopefully, V/STOL craft will be able to operate out of close-in locations away from the main jetport. This not only would shorten the trips between the V/STOLport and the traveler's start or end point, but would also get the passengers out of the heavy jetport air traffic.

For the general aviation pilot, at least in some cases, the development of such a system could provide some desirable fall-out. Obviously, one of the most likely sites for future close-in "metroports" are existing smaller airports not now suitable for commercial operations (for lack of size, and because of the noise potential). The introduction of V/STOL operations into general aviation airports is likely to lead to an upgrading of facilities, such as runway improvement, better air traffic control, introduction of new NAVAID equipment such as ILS, more extensive maintenance and repair shops, etc.

A further development of the system would be the construction of exclusive V/STOLports in or near densely populated areas. Studies already are underway examining the possibility of using the tops of large buildings, elevated platforms over railroad yards or major highways, shipping piers, and even floating platforms in rivers and harbors. This development, which, in fact, realizes the full potential of V/STOL for making air transportation ultra-convenient, also points up one of V/STOL's major technological barriers of the moment, aircraft noise in populated areas.

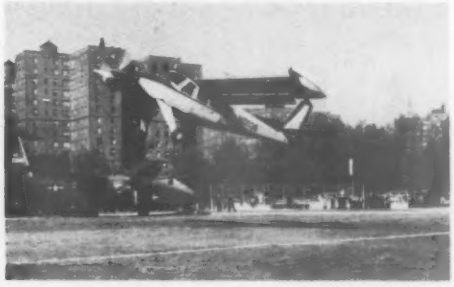
Since the main attraction of V/STOL is its potential to bring air transportation closer to the people it must serve, it is, of course, crucial that people in the immediate area be able to live in harmony with the aircraft. In recognition of this fact, FAA is considering regulations requiring that V/STOL craft satisfy FAA maximum sideline noise specifications when measured from *only 500 feet away*, compared with ¾ of a mile for conventional aircraft. Thus, much of the future of V/STOL transportation rests on efforts to substantially reduce aircraft noise.

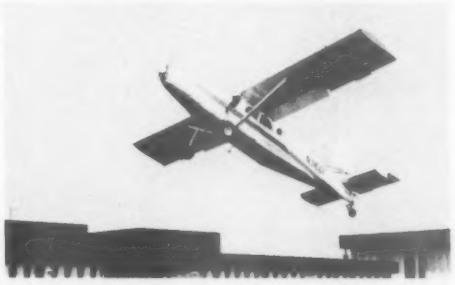
To date, the problem has not been solved, although headway is being made. Downtown daytime city noise generally measures out at about 90 to 95 db with the quieter suburbs running at about 55 db. Aviation planners are convinced that V/STOL will not become a welcome neighbor until its noise level drops to about the same as the background noise level. For the jet engineer of STOL craft this represents quite an engineering problem.

Initial efforts to quiet aircraft engines involved the inclusion of noise-absorbing and noise-suppression materials in the engine pods. While this does some good, it does not get at the basic source of the noise. Now engineers are working with some more exotic concepts, such as spacing and shape of turbine blades within engines to set up sound patterns that interfere with each other and tend to cancel each other out. High bypass ratio turbine engines have been quieted somewhat by surrounding the hot fast-flowing exhaust air with a sheath of cooler, slow-moving exhaust air. Undoubtedly these efforts will continue to yield improvements.

Engine noise, however, is not the only source of annoying aircraft noise. In the case of helicopters, for example, noise from the rotors is far more difficult to quiet. Rotor tips often approach and exceed supersonic speeds so that they, in effect, generate little sonic booms all around the helicopter. The problem with propeller tips in some engines is only a little bit less severe. Again engineers are experimenting with new shapes and spacing of propeller blades in efforts to set up self-cancelling interference patterns in the propeller-generated noise.

Final solutions will probably have to await the emergence of the new generation of STOL aircraft themselves, but FAA is already testing the effects of steeper approach and departure paths of existing aircraft as a means of reducing the area of environmental concern over aircraft operations. Like good little children, the STOL of the future should be seen rather than heard. ■





Four early arrivals on the STOL scene: ***Above left***, McDonnell's ***Breguet***, with its four turboprops evenly spaced along the wing (for better lift), operates with ease from plowed field. ***Right***, DeHaviland's modified ***Buffalo*** is being tested by Boeing under a NASA contract for propulsive lift characteristics. Needle nose is airspeed probe. ***Below right***, Helio ***Stallion*** carries eleven persons at nearly 200 mph, needs less than 800 feet of runway. ***Left***, Fairchild ***Porter*** operates from even shorter runway, about 550 feet over a 50 foot obstacle.

Famous
FLYERS

William Knox Martin stunned Colombians in 1919 when he proposed air mail and passenger service to their isolated mountain capital, Bogota. He reduced mail delivery time from a month to six hours.

William Knox Martin

El Intrepido Aviator Americano

To the inhabitants of the sleepy, isolated mountain villages of Colombia, nothing had ever created such a stir in their lives as the unexpected arrival, in the summer of 1919, of a huge mechanical bird, its engine screaming out the news that "El Intrepido Aviator Americano," William Knox Martin, had returned to South America.

Colombians were treated to their first sight of an airplane earlier that year when, in the town square of Cartegena on the Pacific coast, a young foreigner with a mysterious crate of goods appeared and proceeded to assemble a surplus military *Jenny* before their eyes. To the onlookers, many of whom had never laid eyes on either a train or an automobile, this was a miracle of the first order.

As the personable young "Yanqui" put the finishing touches on his *Jenny* with a flourish, leaflets were distributed among the crowd announcing Martin's willingness to accept paying passengers for short flights over the town, as well as his desire to interest businessmen in financing an airmail and passenger service in Colombia that would connect the semi-isolated (inland) capital of Bogota with major cities located on the coast. Such an air route would pass over the Colombian Andes, three formidable ranges which cross the country north to south, rising to heights over 18,000 feet, with the deep river valleys of Gauca and Magdalena between them.

The transportation system Martin proposed staggered the native imagination. By the beginning of the 20th century less than 75 miles of roads existed in the country, physically as large as England, France and Germany combined. The steep and unstable mountain passes of the Andes made road and railway construction next to impossible. Mail from the coast took as long as a month to reach Bogota, moving up the Magdalena River by boat and then being packed by mules over the mountains. The brash Americano's proposal to fly over this route in less than six hours at first stunned and then interested a group of investment-oriented Colombians who were in a financial position to back an airline. But first they must be convinced by an actual flight to Bogota.

"El Intrepido's" appearance in South America was no mere coincidence. Martin had become convinced that the airplane was destined to topple the physical barriers of this subcontinent as early as 1913 when, at the tender age of 19, he accompanied an exploratory expedition up the Orinoco River in Venezuela, flying a Curtiss biplane with a 60 hp Rosenberger engine. An unfriendly reception on the part of local Indians and alligators turned back the travelers after 200 miles, and Martin fled to the coast vowing to return at a later date.

In the six year interim, young Martin, who was born in 1894 at Salem, Va., gained a world-wide reputation as a truly intrepid aviator. In 1915 he was engaged by Pancho Villa and General Zapata to fly for the Mexican revolutionary forces. Martin transported cargo and bombs, the latter consisting of long-fused sticks of dynamite, which he lighted from a glowing cigar and dropped over the side on Government fortifications. Between flights he was not above taking part in Pancho Villa's cavalry raids.

Martin's reputation as a one-man air force spread across the Pacific, and in 1916 he went to China to train military pilots for Dr. Sun Yat-Sen's revolutionary movement. Next Martin hopped over to Japan and demonstrated his flying skill for the delight and amazement of the Emperor. Next he turned up in Seattle as a test pilot for Boeing and next in England as a member of the R.A.F., later transferring to the United States Marines Flying Corps when this country entered World War I.

Wounded, decorated and discharged, Martin bought a surplus *Jenny* and headed for South America again in 1919, nurturing his ambition to found a trans-Andean airline. This time he went to Colombia, where he had been assured that the hazards would be purely vertical. He quickly demonstrated the effectiveness of the airplane for transportation by delivering mail between the coastal cities of Cartagena and Baranquilla, and personally designed an airmail stamp for the service.

To call attention to the presence of aviation in Colombia, Martin stunted at low altitudes over the countryside, buzzed rooftops and performed figure eights around the twin spires of Baranquilla's cathedral—where four years later he was to be married to a local beauty, Senorita Elvira Verica.

His instant fame as "El Intrepido" notwithstanding, the mountains still remained to be crossed. Martin had to fly his battle scarred aircraft to Bogota before anyone would actually finance a Colombian airline. In August of 1919 Martin made his long awaited attempt. By easy stages he flew his *Jenny* up the Magdalena River as far as, Honda, a small valley town about 75 air miles northwest of Bogota. From Honda he planned to fly to the capital by way of Facatativa, a village nestled on an Andean peak some 18,000 feet above sea level.

His *Jenny* engine was rated generously at 180 hp with a maximum speed of 80 mph, and his navigational instruments consisted of a hand-held 75-cent compass. He took off at 5:05 p.m., on August 5, with many good wishes and much discouragement from those who knew the mountains.

But Martin was an old "iron compass" hand, and he chose to fly Facatativa precisely because one of the few railroad tracks

When Martin flew a flimsy biplane up the Orinoco River in Venezuela in 1913 he was only 19, but he was determined to conquer the forbidding jungle wilderness from the air.

in the country led directly to that mountain hamlet. Making his way with difficulty because of low hanging clouds, iced rigging and a sputtering engine, suffering from nose bleed, headaches and other symptoms of hypoxia, Martin managed to find his way into the Facatativa Pass and down to the plateau on which Bogota, at 8,659 feet, was situated.

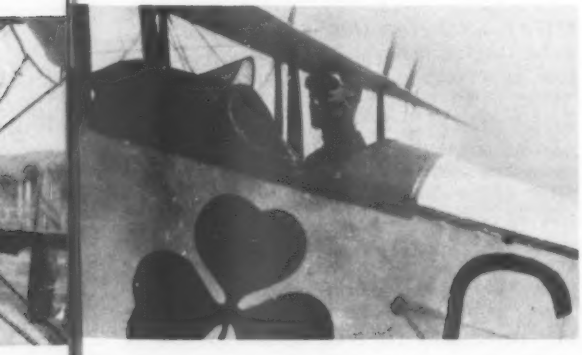
Martin's airborne arrival in the isolated mountain capital (the first aerial crossing of the northern Andes) was probably the most exciting event in the history of the city. He became a hero on the spot, and very soon afterwards, the first "air minister" of Colombia. Before the year was out, the Compania Bogotania de Aviacion was formed with Martin at the helm.

Over the next four years he risked his neck with frequent flights betwen Bogota and the coast, his only passenger a pet ocelot, while the company was acquiring larger aircraft and training South American pilots in the schools he established. By the time it was absorbed by Avianca in 1940, Bogotania Airlines was a national institution and William Knox Martin the widely accepted father of Colombia aviation.

By that date Martin was long gone from the scene. In 1923 he married, gave up daredevil flying and settled down in Baranquilla to make his living as a journalist and artist. Three years later he brought his wife and family, now including two young sons and a third on the way, back to his home town of Salem, Va., and returned to flying on a less flamboyant scale as a corporation and ferry pilot. Ironically, his only serious accident took place in an automobile, and he died of his injuries at Watertown, N.Y. on July 28, 1927.

His untimely passing all but erased his name from the honor scroll of aviation in his native land, but every August, during the Independence Day celebration in Colombia, William Knox Martin is remembered with affection and pride by millions of South Americans whose national progress owes much to "El Intrepido Aviator Americano."

Lt. W. Knox Martin as an instructor in the Canadian Royal Flying Corps in 1917, before transferring to the U.S. Marines in WW I.



■ THEY CAME TO THE FAIR. Nearly 2,000 private aircraft helped swell the throng of approximately 1.5 million visitors to TRANSPO 72 International Transportation Exposition held at Dulles International Airport (Washington, D.C.) May 27-June 4. Some 12,000 total operations were conducted by the Dulles Tower during the nine days of the show, about twice as many as would normally have been handled. Peak day was Sunday, May 28, when 1,600 operations were controlled, including 293 within one hour.

■ "EAGLE EYED PILOT," a movie stressing the importance of pilot vision, filmed against a scenic Alaskan background, is among recent films added to FAA's loan collection. Other recent films deal with noise relief near airports, different types of weather encountered by VFR pilots while flying across the United States, aviation courses in high schools, and the Wright brothers. All films are available on loan from FAA film library at Oklahoma City at no charge.

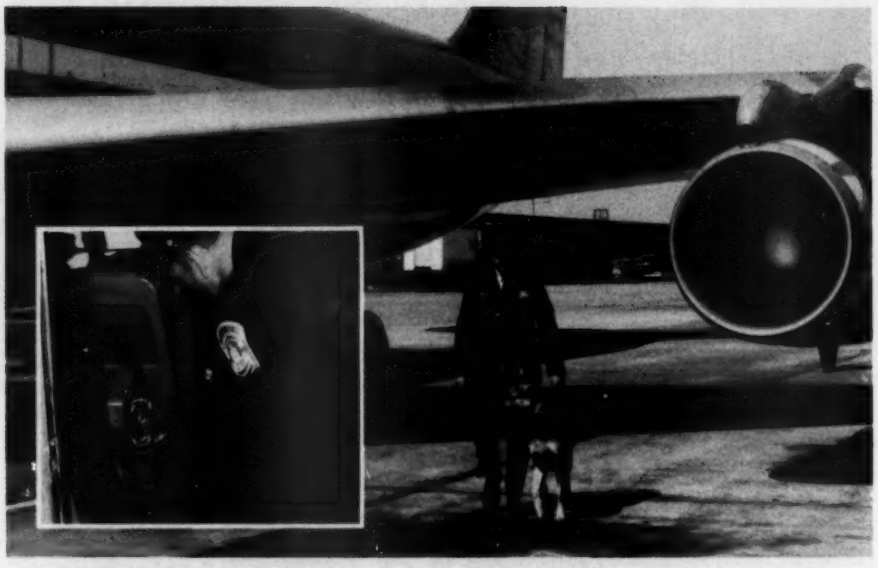
The 1972 film catalog can be obtained free from DOT/FAA Distribution Unit, TAD 484.3, Washington, D.C. 20591.

■ LET THE PEOPLE KNOW. Guidelines for holding required public hearings on airport projects under the Airport Development Aid Program (ADAP) have been updated in a revised FAA circular, also free from the address given above. The circular explains how the public is given an opportunity to express views on proposed airport development (such as location of a new airport or runway relocation, realignment or extension).

Complete instructions are found in Advisory Circular AC 150/5100-7A, "Requirement for Public Hearings in the Airport Development Aid Program." Free, DOT/FAA Distribution Unit.

■ NEW FARS FOR OLD. The new FAR Part 152 incorporates the general requirements of Part 151 (which governed the old Federal Aid Airport Program) plus changes needed to conform with the Airport and Airway Development Act of 1970. The two grant programs for airports now in existence are called Airport Development Aid Program (ADAP) and Planning Grant Program (PGP).

■ HELLO, WEATHER? After August 1 VFR pilots flying along the West Coast can use a discrete weather frequency to talk to a specially trained aviation weather briefer. Enroute weather advisory service (EWAS) will be offered at flight service stations located at Los Angeles and Oakland (full-time) and Portland and Seattle (6 a.m. until 10 p.m.). Final plans call for 48 adjacent states to be covered by 44 EWAS stations in about four years. A single frequency, 122.0 MHz, will provide en route weather data and receive and issue pilot reports. It should not be used for filing flight plans or for pre-flight briefing, best obtained before takeoff.



Dog Detectives May Be Used to Sniff Out Explosives

The use of trained dogs to detect hidden explosives at airports is being evaluated for FAA at Washington National Airport in the Nation's Capital.

Following a 20-week training period, the first contingent of German shepherd dogs and handlers will begin a 45-day test at the airport to determine their effectiveness in locating explosives at airports. The dogs are being specially trained to sniff out the scent of certain chemicals contained in bombs. In a recent demonstration they were able to determine in less than a minute which of four foot lockers contained dynamite.

Aviation security officials believe the dogs may represent the most effective means yet found of combating extortion. Their round-the-clock patrolling of airports is expected to have a psychological effect on potential hijackers.

The estimated cost of four dogs, plus their training, equipment, and maintenance for six months is $34,000 and will be borne by FAA.

Terminal Control Area Proposed for San Francisco

A new terminal control area (TCA) has been proposed for San Francisco International Airport by FAA as part of a long-range program to reduce the potential for midair collisions near congested airports. An air traffic control clearance is required to fly in a TCA and the pilot must have at least a private pilot certificate. The aircraft must have two-way radio, VOR and transponder.

The San Francisco TCA proposal incorporates changes resulting from experience gained with five previous TCAs now operational at New York, Los Angeles, Chicago, Washington and Atlanta. Opinions expressed at public hearings on the subject were also considered.

The TCA at San Francisco would be basically a circle with a 25-mile radius, flattened along the coastline and with substantial cutouts at the north and west to accommodate VFR planes using smaller airports or flying through the area. The TCA has a ceiling of 8,000 feet. The floor ranges from the ground near the airport up to 6,000 feet at the outer edges.

Comments on the proposed TCA (Docket 72-WA-10) should be sent before August 1, 1972, to FAA, WE-500, P.O. Box 92007, Worldway Postal Center, Los Angeles, CA. 90009.

Strobe Runway End Lights Tested

Evaluation is underway of a new Runway End Identifier Light System (REILS) which is expected to provide pilots with earlier recognition of runway thresholds during low visibility and night landings. The 360° strobe-type flasher lights, which can be seen for 20 miles on a clear night, are being tested at Tallahassee, Fla., where ground fog is frequently present.

When used in conjunction with a remote receiver controller the duo-flash lights may be turned off and on or dimmed from an approaching aircraft, as well as from the control tower. In the Tallahassee experiment, control will be by the tower only.

The system costs $11,000 and can be installed in one day.

Fixed-wing Special VFR after Dark Limited to Instrument-rated Pilots

Revised FAA rules for fixed-wing Special VFR operations limit the use of night SVFR to instrument-qualified pilots flying airplanes equipped for instrument flight. The regulation, affecting only fixed wing aircraft, became law on June 22.

Special VFR regulations enable pilots to operate in airport control zones when weather conditions are less than VFR (controlled air space) minimums of three miles visibility and 1,000-foot ceiling. SVFR is banned at 33 major hubs because of heavy traffic.

Studies have indicated that most accidents related to SVFR flight occur at night and involve pilots without instrument ratings. IFR pilots will be permitted to use SVFR at night because of their proficiency in flying on the gauges and because they would be able to change their clearance to IFR if the need should arise.

In Alaska, because of short winter days and widely scattered airports, SVFR use by VFR pilots will be prohibited only when the sun is more than 6° below the horizon, rather than from sunset to sunrise.

WHAT—NO BANANAS? Chimp scorns coffee, tea or milk as he checks out the first class section of American Airlines "Astro Ark" in preparation for annual animal airlift from the West Coast to Ohio. Also on board the special 707 were a killer whale (in a 600 pound whale cradle complete with sprinkler system), an elephant seal in a steel-framed cage, dolphins in slings hung inside watertight, foam-lined vinyl bags, penguins and six Everglades alligators. The animals winter and train in San Diego, return annually to perform during the 110-day season at Aurora, Ohio.

FAA Aviation News welcomes comments from the aviation community. We will reserve this page for an exchange of views. No anonymous letters will be used, but names will be withheld on request.

• Activating Flight Plans

Your article on the Civil Air Patrol ("Fowler's Fate" FAA AVIATION NEWS, April 1972) advises pilots to file flight plans. Is it true that if a pilot files a flight plan, but crashes before activating it, he is not protected?

Nenana, Alaska

True. Flight plans do NOT automatically go into effect at the estimated time of departure. Actually a flight plan is in operation only from the time the pilot activates it with the flight service station until he closes it. For this reason pilots are cautioned to call the FSS as soon as practicable after takeoff to activate the flight plan, and to close it as late as possible in the flight, or even better, immediately after landing. Both these actions should be taken directly with a FSS if at all possible. Incidentally, the numerous pilots who neglect to close their flight plans cause a temendous—and unnecessary—loss of manhours every year.

• Fuel for Thought

I found the article "No Fuel Like Your Own" in FAA AVIATION NEWS, November 1971, extremely interesting but it brings three questions to mind: Why don't they color code jet fuel? Why can't a dye be used which would when it reacts with a small amount of another dye (different grade of fuel) change color drastically? Why doesn't the FAA require some type of fuel test procedure prior to takeoff? Quick draining fuel tanks when no container is in use is next to useless and contributes to pollution.

Richard A. Grum
Madison, Wis.

FAA studies of fuel use and the refueling process have indicated that color coding alone is not the complete answer. The agency is currently examining other possible procedures, such as personnel qualifications and equipment standards for fuel handling. Your suggestions will be considered.

• Higher Mathematics

Your figures on general aviation accidents (FAA AVIATION NEWS, March 1972) were very interesting, but I am puzzled by an apparent inconsistency. Out of curiosity I took the number of aircraft miles flown for each year, and divided it by the hours flown, to see what the average speed of general aviation aircraft would be. For the years 1961 through 1969 the speed increased gradually from 135 to about 159 mph. In 1970 the number fell to 123 mph, and in 1971 went back up to 140 mph. Can you shed some light on this fluctuation?

Also, I feel that your mention of a "slight improvement" in the G.A. accident rate per mile in 1971 was conservative. Even using your figures for miles there was a 9.1 percent decrease in fatal accidents per mile, and a 12.4 percent decrease in total accidents per mile. This is much better than a "slight improvement" (and would be even better if the mile-per-hour figures were consistent with earlier years). I think the G.A. accident rate, while always capable of improvement, is very, very good, compared to the slaughter on the highways.

I'm not critical—just interested in aviation safety. As I've said before, FAA AVIATION NEWS is great.

Paul H. Albert
Massapequa, N.Y.

What appears to be an inconsistency in the recorded number of miles *flown, as compared to the number of* hours *flown in 1970 and 1971 is due to a change in the method of calculating the miles flown in a given year.*

Formerly, the number of hours flown was tabulated from maintenance inspection forms, and this figure was multiplied by the top cruise speed of the planes involved to arrive at miles flown. Now it appears that this mileage figure was unrealistically high, considering time lost in landings, takeoffs, climb-outs, slow cruises, and taxi—and even waiting—time on the ground with the engine running. Since 1970 FAA has been using 75 percent of the top cruise speed as a criterion for estimating miles flown, which means, as you point out, that the improvement in the rate of accidents per mile would be even greater under the old method of calculation. Incidentally, the number of hours flown is now based on figures given by the owners in their annual aircraft registration rather than on figures from inspection forms.

• Geared Up for Trouble

Your article, "Up Hill and Down Dale" in the February 1972 issue of FAA AVIATION NEWS was very informative, but your artist is definitely not a pilot.

In both drawings just before threshold, he forgot to drop his gear. You'll bump more than your nose with this procedure!

Valerio A. Pasqua, D.C.
Bronx, N.Y.

Our artist claims he was illustrating a special wheel-up approach to a short, icy, heavily rutted field. We do not believe him either.

• Flat Lands and Sloping Runways

Your article entitled "Up Hill and Down Dale" in the February 1972 FAA AVIATION NEWS was most informative. I can add one thing to it, with your permission: A sloping runway can be found in places that are not mountainous. We have two in the Kansas City area that I have landed on, and I know of at least one in the Atlanta area that I almost *didn't* land on one night. You can probably still find the tire marks I left from about midfield to the end of the runway.

I elected to land at Gunn Airport, after making three passes down the dimly lighted runway, and I didn't realize the runway sloped until I tried to set down and found myself still airborne with half the runway behind the airplane. A go-around didn't seem advisable because of a large hill half obscured by darkness at the end of the runway. You can believe I memorize the "Remarks" in the *Airport Directory*, now.

David D. Spires
Overland Park, Kansas

• Airport Taxi Charts

The March 1972 issue of FAA AVIATION NEWS mentions that taxi charts for 20 airports were to be available in the early spring.

Since we do not have access to NOS Aeronautical Chart Catalogs we would like to know what airports this includes so that we may order those taxi charts that will apply to our purposes.

Frank D. Berry
Pan American
World Airways
Jamaica, New York

The taxi charts mentioned are published and distributed by National Ocean Survey (NOS), formerly Coast and Geodetic Survey. The airports for which they are available are indicated in the NOS bimonthly listings of "Instrument Approach Procedure Charts." You may have your name placed on the free mailing list for both this bimonthly publication and for the NOS "Catalog of Aeronautical Charts" (issued quarterly) by writing to:

Distribution Division C-44
National Ocean Survey
Washington, D.C. 20235

Thus far about 25 taxi charts have been produced and FAA plans eventually to have them for all FAA tower-controlled airports. They may be ordered directly from NOS at a cost of 10 cents each. Subscribers to IAP charts receive these taxi charts as part of their amendment service at no extra cost.

• My Son, the Pilot

You can imagine my utter surprise on viewing your cover of the May 1972 FAA AVIATION NEWS, since the picture is that of my son, Jack D. Mayers, who in August 1965 attended the first Civil Air Patrol Glider Encampment at Elmira, N.Y.

Jack is a veteran helicopter pilot, having served in Vietnam, has his fixed wing and multiengine ratings, and is now flying with the Army Air National Guard. While at Elmira he soloed, got his "C" badge (U.S. No. 3281) and took his proud parents for a "quiet" ride!

Robert D. Mayers,
Maj. CAP

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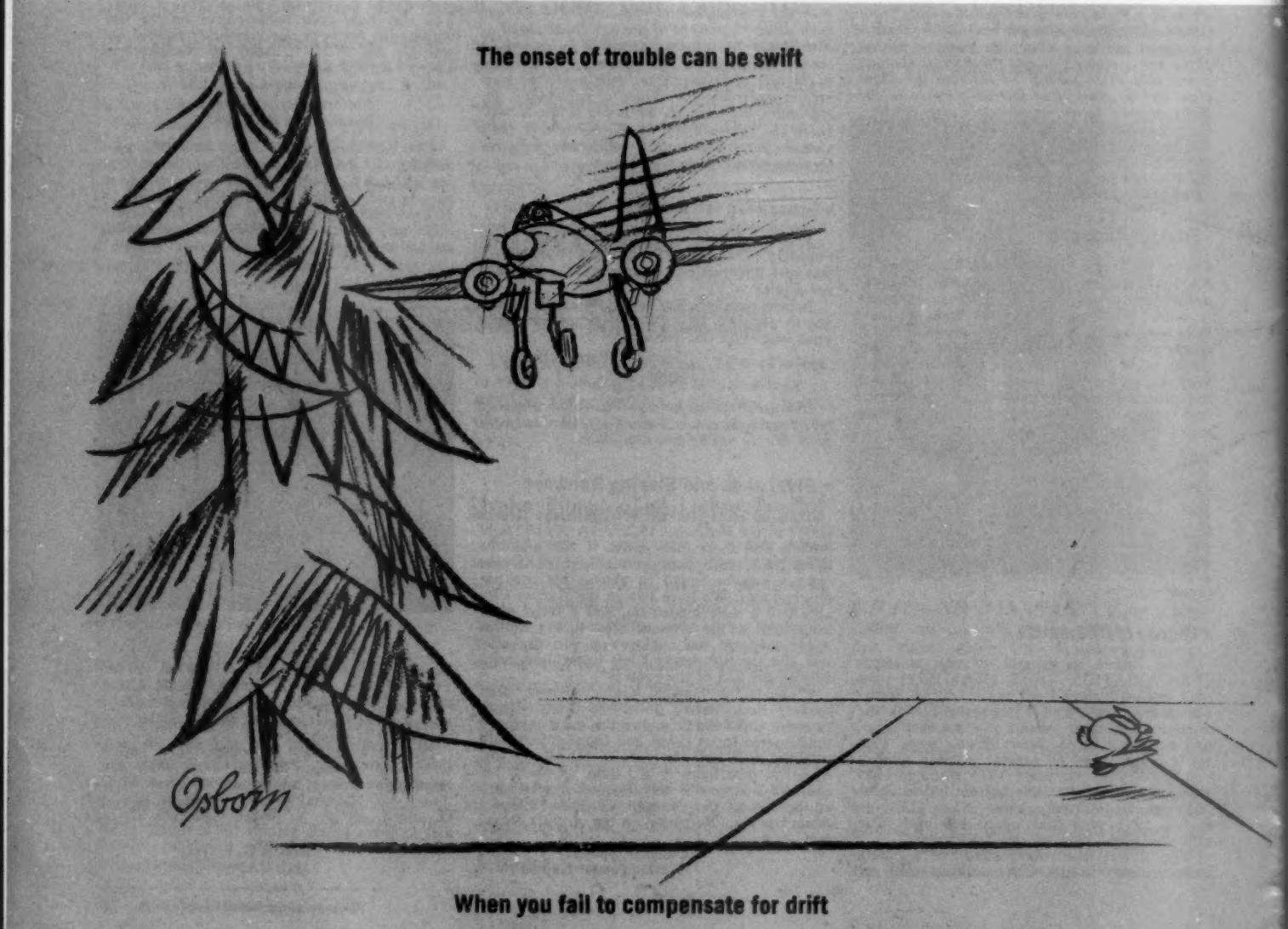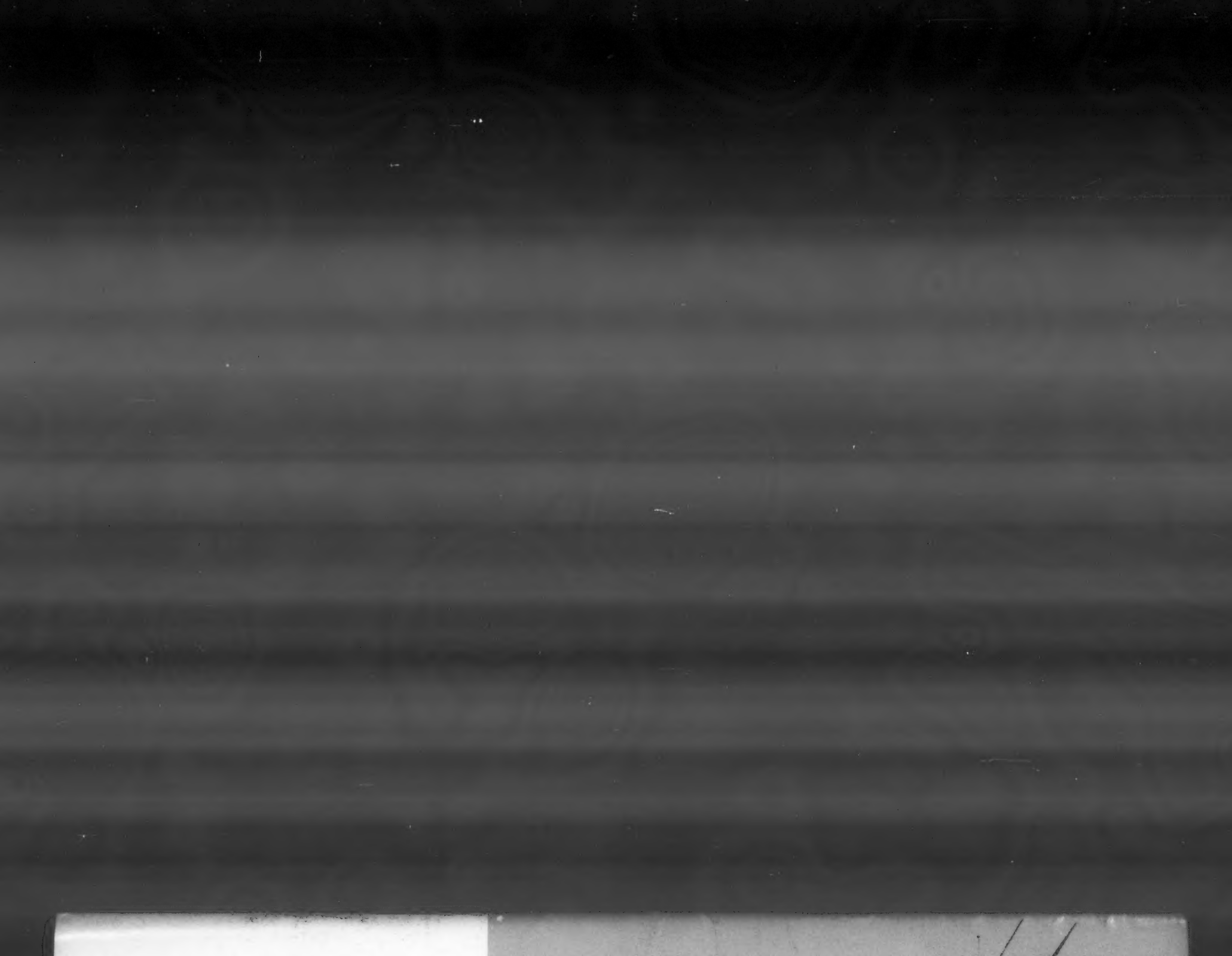
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